Grant Title:
Investigation of the High Latitude Magnetosphere and its Response to the Solar Wind

Type of Report:
Performance Report

Name of the Principal Investigator:
William W. L. Taylor

Period Covered by the Report:
April 15, 1994 to April 14, 1995

Name and address of the Grantee's Institution:
The INSPIRE Project, Inc.
518 Sixth St., S. E.
Washington, DC 20003

1.0 Introduction

This grant was proposed to a NASA Headquarters NRA as a Space Physics Educational Outreach (SPEO) supplement. It was selected and made on April 12, 1994 for a one year period. A renewal is expected.

2.0 Background

The INSPIRE Project, Inc. has provided radio receiver kits to over 1100 high school classes over the last five years to make observations of signals from transmitters in the atmosphere and ionosphere at audio frequencies. Natural radio phenomena in the audio frequency range observable in the atmosphere include:

- Sferics - the impulsive, broadband electromagnetic noise produced by lightning that propagates in the earth-ionosphere waveguide.
- Whistlers - magnetospherically processed sferics that propagate along the earth's magnetic field from hemisphere to hemisphere, becoming dispersed in frequency as they propagate (higher frequencies propagate fastest, thus arriving sooner).

Manmade signals in the audio frequency range are primarily from radionavigation transmitters whose signals propagate in the earth - ionosphere waveguide:

- OMEGA, operated by the US.
- ALPHA, operated by Russia.

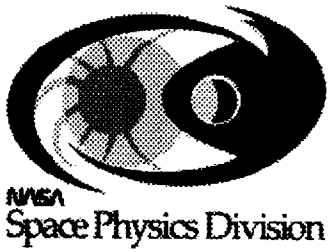
INSPIRE is a non-profit scientific, educational corporation whose objective is to bring the excitement of observing natural and manmade radio waves in the audio region to high school students. Underlying this objective is the conviction that science and technology are the underpinnings of our modern society and that only with an understanding of science and technology can people make correct decisions in their lives, public, professional, and private. Stimulating students to learn and understand science and technology is key to them fulfilling their potential in the best interests of our society.

INSPIRE also is an innovative, unique opportunity for students to actively gather data that might be used in a basic research project. INSPIRE began with a test bed project, ACTIVE/HSGS, which involved 100 high schools, with a centerpiece of making observations of 10.5 kHz transmissions from the Soviet ACTIVE satellite. A large number of ground receiving sites was needed, both to enhance the probability of receiving the radio waves from ACTIVE, and to determine the propagation paths to the ground.

The second major project was support to SEPAC (Space Experiments using Particle ACcelerators), a payload on the ATLAS 1 Spacelab mission, flown in March/April 1992. With its electron accelerator SEPAC performed many experiments in the ionosphere, including producing an artificial aurora and the electromagnetic waves produced by pulsing the electron beam. INSPIRE/SEPAC provided more than 1000 ground stations to receive the radio waves, and, at the same time, allowed high school students the opportunity to take data that would be used in a published basic research project.

3.0 Report

The grant was awarded to provide support for INSPIRE. An excellent summary of the activities of INSPIRE is given in Attachment 1, a presentation given to Dr. W. Huntress, Associate Administrator for Space Science at NASA Headquarters on February 23, 1995.



INSPIRE

SPACE PHYSICS EDUCATIONAL OUTREACH

INSPIRE

PRESENTATION TO:

WES HUNTRESS

AND THE

OFFICE OF SPACE SCIENCE
NASA HEADQUARTERS

FEBRUARY 23, 1995

Presented by:
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Attachment 1

INSPIRE

Outline

- Background
- Objectives
- History
- Recent Accomplishments
- Future Plans

INSPIRE

What is INSPIRE?

- An educational/scientific project to stimulate interest in science and technology in K-12 students
- An SPEO Grant recipient
- A nonprofit corporation

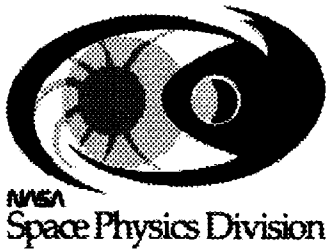
INSPIRE

What are INSPIRE's objectives?

- To provide access to radio receivers to K-12 students so they can observe natural and manmade VLF radio waves that have been processed by the ionosphere and magnetosphere
- To learn more about the ionosphere and magnetosphere
- To give students experience in building electronics, planning experiments, and taking and analyzing data
- To give teachers a real world application to anchor their science teaching
- To show students examples of waves, electromagnetic waves, plasma physics, ionospheric physics, magnetospheric physics, electronics, mechanicial and electronic construction, and data processing

History of INSPIRE

- ACTIVE, a US/USSR project to study the propagation of VLF waves from the ionosphere to the ground, was the first opportunity
- TRW gave a grant to help provide receivers and study materials to 100 schools to observe ACTIVE from the ground
- Letters sent to 10,000 largest high schools in US inviting their participation
- More than 1000 schools participated in observations of audio frequency pulsed electron beams from SEPAC on ATLAS 1



INSPIRE

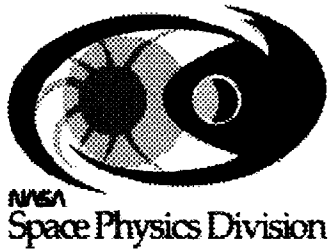
Recent Accomplishments

- Received SPEO grant and matching Hughes/STX grant
- INSPIRE student observing teams made observations before, during and after the May 1994, annular solar eclipse across the US
- Third year of publishing the INSPIRE Journal
- Call for Workshop organizers issued in INSPIRE Journal
- INSPIRE Home Page created on World Wide Web, URL: http://www.gsfc.nasa.gov/education/inspire/eclipse_94.html

INSPIRE

Recent Accomplishments (Continued)

- Chaffey High School won $10k grant for INSPIRE data analysis equipment
- Participated in AGU Precollege science education workshop
- Spring and fall school observing campaigns
- Solstice and equinox baseline national observing campaigns begun
- Stock of INSPIRE receiver kits purchased to offer to schools
- INSPIRE offered to take data for TSS1R
- Letters sent to 3000 more high schools, offering participation in INSPIRE



INSPIRE

Future Plans

- Workshop(s) planned for late in school year
- Spring and fall 1995 campaigns
- Vernal equinox, summer solstice, autumnal equinox and winter solstice campaign
- INSPIRE participation planned to be proposed in Jim Burch's MIDEX proposal
- Radio Plasma Imager/Sounder to radiate 3 to 10 kHz VLF waves at perigee, students to command RPS over Internet for INSPIRE operations
- Present INSPIRE paper at Space Science Institute's Precollege Education Workshop for Space Scientists
- MIR electron beam experiment INSPIRE observations being arranged for spring, 1995 with Stas Klimov